WM. M. MAN

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PSYCHE

VOL. XXXIII. AUGUST-OCTOBER Nos. 4-5

SOME NEW NEOTROPICAL ANTS

By W. M. Mann

U. S. National Museum, Washington, D. C.

Descriptions of the new species given in the following paper are presented at this time so their names may be used in connection with new species of myrmecophilous beetles. One interesting new form, which has been collected from the stomach of a toad by members of the Bureau of Biological Survey, is also included.

Eciton gracellæ, new species.

Worker.—Length 2.75-4 mm.

Head a little longer than broad, broadest in front of middle, sides moderately convex, posterior corners narrowly rounded, border shallowly concave. Eyes very distinct, situated a little behind the middle of front of sides. Mandibular blades finely and bluntly denticulate. Antennal scapes extending a little beyond the eyes, all funicular joints longer than broad. Thorax rather slender, in profile evenly convex. Epinotum on a lower plane than the promesonotum, its surface shallowly impressed at basal half, very feebly convex behind, twice as long as broad and one and one half times as long as the declivity, into which it very broadly rounds. Petiole in profile a little longer than high, convex above, with the antero-ventral spine strong, elongate, curved and acute at apex, extending backward; from above longer than broad, with feebly convex sides, postpetiole in profile as long as high and convex above; from above a little longer than broad, with nearly straight sides. Legs long, rather slender, claws simple.

Shining. Mandibles rather coarsely striate. Head and body sparsely, moderately, coarsely punctate, except on the impressed anterior portion of epinotum and on the meso- and metapleuræ which are densely punctate and subopaque.

Fine, elongate, erect yellowish hairs abundant on head, body and appendages, on the gaster mixed with shorter and subappressed hairs.

Gaster dark brown to black, remainder bright brownish red.

Type locality.—Ototonilco, Jalisco, Mexico.

Cotypes.—Cat. No. 29045 U. S. N. M.

Described from nine workers taken from a file running through the grass in an orange grove, and named in honor of Señorita Graciella Mercedes Maderiaga, the child who found them.

Eciton (Acamatus) peninsulare, new species.

Worker major. Length 3.5 mm.

Head about one fifth longer than broad, slightly broader in front than behind, with broadly and shallowly concave posterior border and rounded corners. Eyes not discernible. Mandibles with several rather stout, separated teeth basally and one larger one forming an angle between the base and the blades. Antenna stout, scape broadened and somewhat compressed apically, extending about three eighths the distance to occipital corners; funicular joints 2 to 8 a little broader than long, 9 and 10 as long as broad, apical about as long as the two preceding joints together. Thorax rather stout, compressed laterally, nearly flat above; epinotum more than half as long as pro- and mesothorax together, its base on the same plane as the mesonotum and separated from it by a narrow, though strong impression, declivity distinctly shorter than the base and broadly rounding into it. Petiole in profile only slightly longer than high, convex above, antero-ventral tooth moderate in size and blunt at tip; from above subquadrate, about as long as broad; postpetiole from above transversely oval and one third broader than the petiole; antero-ventral tooth stout and blunt at tip. Claws simple.

Shining. Mandibles with short, coarse striæ; head and body with distinct, widely separated punctures, coarsest and most abundant on the mesonotum, finest on the gaster.

Suberect, fine yellowish hairs rather sparsely distributed on head, body and appendages.

Color pale to rather dark brownish yellow.

Worker minor. Length 1.5 mm.

The smallest specimens in the colony differ in having the head one and two thirds times as long as broad, with straight sides (convex in the larger workers) and more deeply excavated posterior border and the meso-epinotal impression feebly impressed.

Type locality.—La Palma Davila, Lower California.

Cotypes. Cat. No. 29046 U. S. N. M.

Described from a series of 33 workers taken by the writer from a cluster beneath a stone. Among them were numbers of a Staphylinid beetle, which I have recently described as *Pulicomorpha coccum.*

Eciton peninsulare is related to *Eciton californicum* Mayr, but much smaller in size and distinct in the absence of eyes, the more elongate head, as well as the smoother, more shining and sparsely punctate integument.

Eciton (Acamatus) sumichrasti Norton.

Female.—Length 11.5 mm.

Head from the front about as long as broad, slightly broader in front than at occipital border, sides feebly rounded, occipital border emarginate, occiput and vertex with large impressed areas; vertex and front with a median longitudinal groove that becomes stronger anteriorly and terminates at posterior border of clypeus. Ocelli lacking; eyes of a single, white facet, situated a little behind middle of sides of head. Mandibles slender, thickest at middle, nearly straight, their tips obtusely pointed. Median, triangular portion of clypeus longer than broad, anterior border very feebly emarginate. Frontal carinæ anteriorly rather acute above, posteriorly broad and convex. Antennal scapes robust, clavate, about half as long as head; funiculi more slender than scape, the first joint as broad as long, the others distinctly longer than broad, the terminal slender, connate and nearly as long as the two preceding joints together. Thorax long, very gradually widened from front to rear, in profile about three times as long as deep, slightly rounded in region of pronotum, flat behind, the dorsal surface of mesonotum shallowly, though distinctly impressed at middle. Propleuræ shallowly and broadly impressed. Promesonotal suture very indistinctly indicated by an impressed line; mesometanotal suture not discernible. Meta-epinotal impression distinct. Basal portion of epinotum much longer than the flat declivity, into which it broadly rounds; dorsal surface a little broader than long, strongly and broadly impressed at middle, the impression deepest posteriorly, sides behind middle subgibbous. Petiole from above transverse, not as broad as epinotum, sides very feebly divergent behind, anterior corners broadly rounded, posterior corners projecting and obtusely angulate, posterior border strongly emarginate, dorsal surface concave at middle, with rather strong convexities at sides of concave portion, then sloping and indistinctly impressed toward lateral borders; seen from the side the node is much higher than long, arcuate in front and above and emarginate on posterior outline, with the anterior portion of sides convex and the posterior concave. Gaster elongate oval. Hypopygium and pygidium submembraneous at borders, which in the former are nearly straight and in the latter triangularly excised. Sting not visible. Legs rather short, slender. Claws simple.

Gaster shining, the rest nearly opaque. Head, thorax and epinotum densely and finely punctate, the head more shallowly than the rest, and in addition with scattered, coarser punctures most conspicuous on the epinotum. Petiole densely and shallowly punctate and more shining. Gaster with distinct, irregular, separated punctures, each of which bears a moderately long, stiff, finely pointed yellow recumbent hair. Mandibles and anterior border of clypeus sparsely punctate.

Erect hairs yellow, fine and abundant on head, thorax and petiole and appendages.

Dark ferrugineous red, appendages paler, antennæ yellowish.

Described from a female found with a cluster of workers beneath a stone on the edge of the Barranca de Oblatos at Guadalajara, Jalisco, Mexico.

Alfaria bufonis, new species.

Worker.—Length 5 mm.

Head one fourth longer than broad, as broad behind as in front, sides feebly convex, occipital corners broadly rounded, border shallowly concave. Clypeus slightly convex, broadly rounded at anterior border. Frontal area very distinct, the surface immediately in front strongly, transversely impressed. Antennal scapes slender basally, clavate toward apex, surpassing occipital corners by a distance nearly equal to their width at tip. Eyes small, round, convex, situated at middle of sides of head. Promesonotum widest in front of middle, sides very feebly rounded, surface slightly convex; inferior corners obtusely angulate. Epinotum separated from mesonotum by a distinct though narrow transverse groove, its basal surface on a lower plane than the mesonotum, as long as the declivity, broadened behind; slightly convex in profile. Petiolar node in profile longer than high, convex above, with a sloping anterior face; from above longer than broad, with sides rounded behind and nearly straight in front. Gaster similar to that of *Alfaria simulans* Emery.

Subopaque. Head, thorax and abdomen with coarse, irregular punctures, approximate and with the surface between appearing as a reticulum on the head and especially the pronotum, less approximate on dorsal surface of petiole and abdomen and widely separated on metapleuræ, the entire surface with a silk-like sheen; front of head at middle with a subtlely striate area; frontal lobes and mandibles rather coarsely striate; antennal scapes and legs with distinct, separated shallow punctures and dense microscopic striolæ.

Fine and silky, yellowish hairs moderately abundant on head, body and appendages.

Dark brown to black, with a red-brown tinge, mandibles and appendages lighter.

Type locality.—Choapam, Oaxaca, Mexico.

Type.—Cat. No. 29047 U. S. N. M.

Described from a single worker taken from the stomach of a toad (*Bufo valliceps* Weig., U. S. N. M. 46967) collected by Nelson and Goldman, July 28, 1894.

The type lacks the antennal funiculi and portions of the legs, but is otherwise in good condition, with the pilosity well preserved. *Alfaria simulans* Emery, the nearest species, differs in its shorter and stouter antennal scapes, in the entire absence of an impression between meso- and epinotum, in its larger size and lighter color.

Leptogenys (Leptogenys) peninsularis, new species.

Worker.—Length 7.5 mm.

Head, excluding mandibles, more than one and one half times as long as broad, a little broader in front than behind, with feebly arcuate sides, broadly rounded occipital corners and straight border. Clypeus carinate at middle, the anterior projecting triangular portion as broad as long and subacuminate at tip, the median lobes at middle of sides of front border low and rounded. Mandibles distinctly shorter than sides of head, seen from the front nearly straight, broadened apically, inner border of basal portion subcultrate and terminating in an inner small, broad lamellate triangle, blades strongly concave. Antennal scapes surpassing occipital angles by about three-eighths of their length, second funicular joint one and one-half times as long as the first, remaining joints shorter and slightly thicker toward apex, the terminal as long as the two preceding joints together. Eye about as long as its distance to border of clypeus. Pronotum as broad as long, broadest behind middle, sides convex, dorsal surface slightly convex. Mesonotum slightly longer than broad, with straight sides and posterior border. Meso-epinotal impression moderate. Epinotal base nearly straight in outline and about twice as long as the flat declivous portion, into which it broadly rounds. Petiolar node higher than long, anterior surface broadly convex, posterior surface flat, dorsum broadly rounding into anterior and narrowly into posterior surface; from above longer than broad, slightly widest behind, with sides feebly arcuate. Abdomen elongate; sting strong. Legs long and slender.

Head and thorax subopaque, finely and densely reticulo-striolate, the striæ transverse on posterior part of head, median portion of pronotum and on the meso-and epinotum; petiole with more subtle striation and gaster shining, with fine separated punctures. Mandibles sparsely and coarsely punctured and very finely striolate.

Fine, erect hairs rather sparse on head, body and legs; appressed yellow pilosity rather thin on head, thorax and abdomen.

Color ferrugineous.

Type locality.—Comondu, Baja California.

Cotypes.—Cat. No. 29048 U. S. N. M.

Described from 36 workers collected by the writer from colonies found beneath stones by the stream that waters the valley at Comondu. In size, structure of the head and mandibles and in sculpture and pilosity and coloration, *Leptogenys peninsularis* is widely different from any of the described neotropical species.

Erebomyrma nevermanni, new species.

Worker.—Length 1.25 mm.

Head, excluding mandibles, a little longer than broad and about as broad in front as behind, with evenly arcuate sides, rounded occipital corners and very feebly concave border. Mandibular blades with four rather strong teeth. Median portion of clypeus convex, bordered at sides by narrow carinæ terminating at sides as triangular teeth, feebly emarginate at anterior border. Frontal carinæ delicate, continued to rear occipital border. Antennal scape extending slightly more than two-thirds the distance to occipital corners, slenderly clavate, first funicular joint stout, about as long as the three following together, joints 2-8 small, strongly transverse, club nearly as long as the remainder of funiculus, with the penultimate joint less than half as long as the terminal. Eyes minute, situated a little in front of middle of sides of head. Thorax robust. Pro-mesonotum feebly convex above, humeri subangulate, anterior border with a narrow elevated margin, sides feebly arcuate and converging to the posterior border which is a little more than half as broad as the anterior.

Mesoëpinotal impression strong. Base of epinotum somewhat transverse, longer than the declivity and narrowly rounding into it; with a pair of acute triangular spines, nearly as long as their distance apart at base. Petiolar peduncle nearly as long as the node, which in profile is conical and as high as long, and from above elongate oval. Postpetiole longer than broad and twice as broad behind as in front, sides nearly straight, in profile much longer than broad, convex above. Femora slender basally and clavate apically; tibiæ stout.

Gaster and postpetiole, mandibles and legs shining, the remainder feebly shining. Mandibles sparsely punctate. Clypeus and middle of front smooth, remainder of head rugulose-punctate and with sparse striæ which are longitudinal on front, reticulate on occiput and diagonal on cheeks. Promesonotum sculptured like the head, with the striæ irregularly longitudinal. Epinotum and meta- and epipleuræ and petiolar peduncle cribrately punctate. Petiole, postpetiole, gaster and legs smooth.

Hairs long, erect and very fine, moderately abundant on thorax and abdomen, shorter and semirecumbent on head and appendages.

Rather pale reddish brown; legs, tip of antennæ and often the petiole and gaster yellowish.

Type locality.—Hamburg Farm, Reventazon, Santa Clara, Costa Rica.

Cotype.—Cat. No. 29049 U. S. N. M.

Mr. F. Nevermann found the colony in a rotten log, in company with *Euponera* (*Trachymesopus*) *stigma* Fabr.

Erebomyrma longi Wheeler, from Texas, differs in having the head longer and, in profile, much thinner, the humeri are not angulate, the anterior border of pronotum, not margined, the epinotal spines shorter and the post petiole transverse, as well as in its finer sculpture and paler color.

Strumigenys (Tingimyrmex), new subgenus.

Head elongate, not strongly excised behind. Mandibles short, remote at base, with a series of microscopic teeth at apical third. Antennal scrobes deep and broad and extending length of head. Pronotal humeri with lamellate spines, postpetiole very large and broad. Clypeus, scrobes, posterior border of head, anterior border of thorax, sides of epinotum, upper and lower surfaces of petiole and lower surface of postpetiole with broad, thin, semitransparent lamellæ.

Genotype.—*Strumigenys* (*Tingimyrmex*) *mirabilis*, new species.

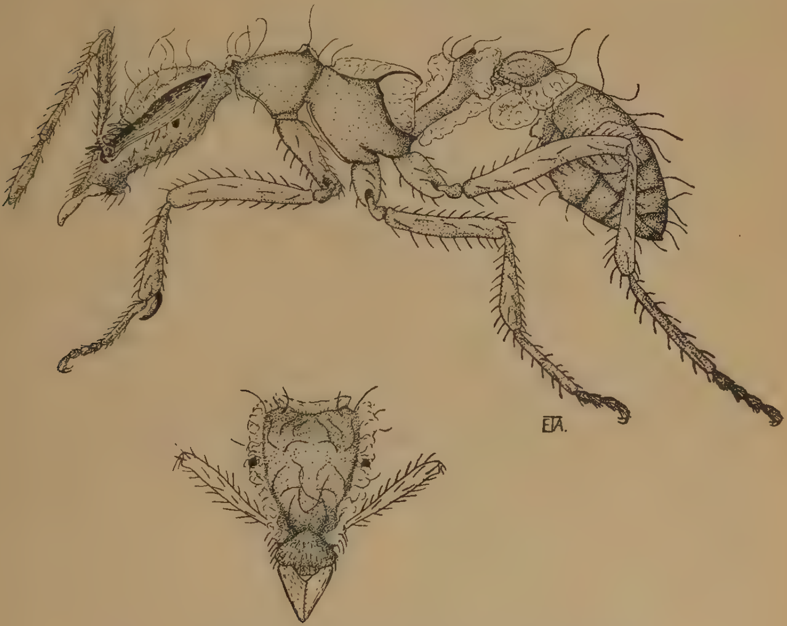

Fig. 1. *Strumigenys* (*Tingimyrmex*) *mirabilis*, new species, worker.

Strumigenys (Tingimyrmex) mirabilis, new species (Fig. 1).

Worker.—Length 2.25 mm.

Head, excluding mandibles, nearly two times as long as broad and about twice as broad at occiput as in front, sides posterior to eyes nearly straight and parallel, in front of eyes convergent, then very feebly sinuate and slightly divergent to anterior border; occipital corners angulate, border shallowly emarginate; vertex rather strongly convex. Clypeus broadly convex, arcuate at anterior border. Mandibles a little more than half as long as head, slender, acuminate. Antennal scapes slender basally, somewhat thickened at apical half, attaining occipital corners; first funicular joint thicker and scarcely shorter than the second, which is a little more than three times as long as broad and subequal to the third, fourth joint two thirds as long as the terminal, which is subfusiform and pointed at tip. Eyes small, very convex, situated on lower margin of antennal fossa, well behind middle. Pronotum nearly flat, broadest in front, sides moderately arcuate, anterior angles with thick, blunt spines longer than broad, posterior angles with elevated, broad, lamellate triangular teeth, the bases of which continue as elevated side margins to the strongly sloping mesonotum. Epinotum slender, the base shorter than the declivity and rounding into it, strongly margined at sides, the margins prominently expanded and angulate between basal and declivous portions, nearly parallel on the declivity, nearly convergent anteriorly on the base, making that portion from above triangular in shape and less than twice as long as broad. Petiolar peduncle slender, longer than the node; node in profile with a rather concave dorsal surface, as long as the sloping anterior surface and much shorter than the posterior surface; from above transverse, prominently angulate at sides, subangulate in front, exposed posterior outline arcuate. Postpetiole nearly as broad as base of gaster and more than three times as broad as petiole, less than twice as broad as long, evenly convex above, anterior border straight, sides arcuate, posterior border in three subequal parts, the lateral lines feebly and the median distinctly emarginate. Legs long and rather slender.

Exposed areas smooth and shining, dorsal surface with sparse, exceedingly long and flexuous hairs, mingled on the head and thorax with shorter, coarser and strongly curved erect hairs; legs with stiff, moderately long, curved, semirecumbent hairs.

Pale brown, appendages lighter, gaster darker.

Type locality.—Huachi, Beni, Bolivia.

Cotype.—Cat. No. 29050 U. S. N. M.

Described from a series of workers found by the writer beneath a stone.

In writing the description, a cleared specimen has been used to make out the outlines, which in parts are concealed by plates of thin semi-transparent chitin, the development of which is extreme in this species. This is not unlike yellowish mica with reticulate lines through it, and not only margins the clypeus, scrobes, occipital border of head and anterior border of pronotum, but occurs as high thin plates on the epinotal margins and the dorsal and ventral surface of petiole at middle and is acutally spread over the surface in places, especially on the clypeus and front of head (except the median portion of vertex).

These plates are chitinous in nature, as are the spongiform processes, and Dr. N. E. McIndoo, who kindly examined some specimens for me, writes as follows:

"In regard to the nature of the spongy material on the peduncle and other parts of a new species of ant from Bolivia, I believe that it is chitinous, and not a waxy secretion, for the following reasons. When an alcoholic peduncle had been cleared in xylene and mounted in balsam, and then observed under an oil-immersion lens, the porous or spongy material had the same shade of light yellow as that of the hairs and other chitinous parts; and the external wall of this material was continuous with the external wall of the chitinous integument. After the same peduncle had been treated with cold caustic potash for 18 hours, the spongy material was not destroyed. This is a sure test for the presence of chitinous structures. Considering the above and also that no pores are visible in the integument of this peduncle, it would appear that this material is formed when the hairs and chitinous integument are formed, and not at a later time."

A NOTE ON *BERIS ANNULIFERA* (BIGOT).

By Charles W. Johnson.

Boston Society of Natural History.

This seems to represent an extremely variable species. Specimens with all the femora and tibiæ yellow, have been referred to *B. morrisii* Dale, a European species, which has however quite a different genitalia. I have not seen a typical *morrisii* from America. Numerous specimens from New England and Canada agree with Bigot's description although "Georgie" is given as the type locality. In a series of fifty-two specimens I am unable to find characters of specific value, but there seem to be three quite marked varieties, based on the general color of the legs. Notwithstanding the fact that intermediate forms exist, it seems well to consider these varieties rather than to have Bigot's description the only means of determining this variable and widely distributed species.

Beris annulifera (Bigot).

Oplacantha annulifera Bigot, Ann. Soc. Ent. France, 1887, p. 21.

Legs yellow, the posterior femora with a more or less prominent sub-apical band of brownish black, tarsi black with the base of the metatarsi yellowish. Its distribution is as follows: Bretton Woods, N. H., June 24, Oquossoc, Me., July 2, (C. W. J.), Lake Nipigon, July 4 and Lake Abittibi, Ontario, June 23 (N. K. Bigelow), English River and Athabasca River, (Kennicot) N. Calif., (Mus. Comp. Zool.) Alaska, (Coquillett).

Around the base of Mt. Washington, N. H., there are associated with the typical form the two varieties described below. There is also considerable variation in the venation. The two veins extending from the tip of the discal cell may be quite widely separated, close together, or fused and petiolate. A few specimens have an angle and stub—a vestige of a fourth vein arising from the discal cell. The latter variation is best shown in a series from Lake Nipigon, Ontario, collected by N. K. Bigelow.

Beris annulifera var. **luteipes** var. nov.

Beris morrisii of authors, not Dale.

Femora, tibiæ and posterior metatarsi entirely yellow, the front and middle metatarsi yellow except the tip, the remaining tarsal joints blackish.

Holotype and *allotype* Seattle, Wash. (O. B. Johnson); Denver, Col. (Oslar); Kearney, Ontario (M. C. Van Duzee); Lake Nipigon, Ontario, (Bigelow), collection of C. W. Johnson. Glen House, and Bretton Woods, N. H., St. Johnsbury, Vt. (Boston Soc. Nat. Hist.).

This form is more prevalent in the females than in the males.

Beris annulifera var. **brunnipes** var. nov.

All of the femora and tibiæ dark brown, the extreme tips of the femora and basal third of the tibiæ yellow, the tarsi entirely dark brownish black.

Holotype and *allotype*, Parroquet Island, Labrador, July 21, 1887, "Arethusa coll." (S. Henshaw). In the collection of the Boston Society of Natural History. Paratypes from the same locality in the Museum of Comparative Zoology. There are also specimens from Bretton Woods, N. H. in the Society's collection, and from the mountains east of Codroy, Newfoundland, July 19, (P. G. Bolster) in the author's collection.

HETEROPTERA IN OCEAN DRIFT.[1]

By J. G. Myers.

The presence of occasional terrestrial insects or their remains, in beach drift is a phenomenon of little ethological significance; but the occurrence on some rare occasions, under circumstances but little understood, of considerable windrows extending sometimes for miles along the beach and often consisting of little else but insects, is a matter for legitimate speculation.

In 1915 Torre Bueno published extensive records of Heteroptera found in drift on lake and ocean shores, and in 1917 Parshley made further observations on this phenomenon. Mr. P. J. Darlington makes a practice of examining such drift on the Massachusetts coast for Coleoptera, and he has kindly given me four small collections of Heteroptera from this material. Though the species present are not extremely numerous, the circumstances of season and composition render them worthy of record as modifying certain conclusions of previous writers on this obscure subject.

In the lists which follow, the species marked B were present also in Torre Bueno's material, while P indicates those observed by Parshley.

Nahant, Mass., 19th May, 1926.

Pentatomidæ
  1 *Podisus maculiventris* (Say) B
  1 *Podops cinctipes* (Say) BP
Aradidæ
  6 *Aradus robustus* Uhl. (3 males and 3 females).
  2 *A. quadrilineatus* Say
  1 *A. falleni* Stål
Lygæidæ
  1 *Cymus angustatus* Stål P
  1 *Drymus crassus* Van D.

---

[1] Contribution from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 268.

6 *Eremocoris ferus* (Say) BP (The most abundant species, Bueno, 19th July)

2 *Cryphula parallelogramma* Stål

Gerridæ

1 *Gerris rufoscutellatus* Latr. B

Miridæ

1 *Lygus pratensis* (L.)

Ipswich, Mass., 22nd May, 1926.

Pentatomidæ

1 *Meadorus lateralis* (Say)

Aradidæ

5 *Aradus robustus* Uhl.

1 *Aneurus inconstans* Uhl.

Lygæidæ

5 *Eremocoris ferus* (Say) BP

Nahant, Mass., 13th June, 1926.

Cydnidæ

2 *Amnestus spinifrons* (Say) B (Most abundant species, Bueno, 3rd Oct.)

3 *Galgupha nitiduloides* (Wolff)

1 *G. atra* (A. and S.)

Pentatomidæ

1 *Podops parvula* Van D.

1 *P. cinctipes* (Say) BP

Aradidæ

1 *Aradus similis* Say

Lygæidæ

1 *Ozophora picturata* Uhl.

1 *Blissus leucopterus* (Say)

3 *Eremocoris ferus* (Say) BP

Tingidæ

1 *Corythucha juglandis* Fitch

Miridæ

1 *Capsus ater* (L.) P

1 *C. ater* var. *semiflavus* (L.) P

2 *C. ater* var. *tyrannus* (Fabr.)

Ipswich, Mass., 20th June, 1926.

Pentatomidæ
- 1 *Menecles insertus* (Say)

Lygæidæ
- 1 *Eremocoris ferus* (Say) BP

Miridæ
- 5 *Capsus ater semiflavus* (L.) P
- 3 *C. ater tyrannus* (Fabr.)

As to the season, it is interesting that Parshley's three records of the phenomenon in question occurred between 21st June and 1st August, while Bueno's observations, extending over a considerable number of years, were made in July, September and October. Mr. Darlington's first two lists are then apparently the first to be compiled in spring.

With regard to supposedly collaborating circumstances, Parshley noticed that "in each case there was a light on-shore breeze with fair weather, and in none was the occurence preceded by an unusually violent off-shore wind, though on the day before the last a moderate land-breeze was observed." Bueno notes that on at least one of the occasions when he collected ocean drift there was "a heavy sea breeze." In the present cases Mr. Darlington recognizes certain weather conditions as necessary for renumerative drift collecting; but these conditions seem to depend more upon warmth and bright sunshine acting as stimuli to extensive flights, than of direction of wind. The wind on 19th May for instance was quartering, but blowing rather more on- than off-shore; while on the 22nd, the direction of the breeze was practically parallel to the beach. On both these occasions, and in fact on all days when collecting was well rewarded, according to Mr. Darlington, the weather was hot and insects were observed flying in the sunshine.

As an example of the form in which the material is found, the drift on 19th May was said to consist of a broken windrow extending for about half a mile. The most common constituent insect was a Bibionid, which made up more than all other species combined. Next most abundant were Coleoptera and thirdly Heteroptera.

Finally, as to the Heteroptera represented in beach-drift, Bueno records 66 species, of which 22 were in Lake Michigan drift and 49 in ocean debris (with 5 common to both situations). Parshley adds over 30 more species, while the present lists include 17 forms not previously recorded. It is therefore obvious that we are still far from knowing how many eastern North American Heteroptera may occur in this plight, but the extreme variety of the records so far published renders it likely that any species may be so found. In Bueno's material the Pentatomids (*sens. lat.*) were far the most plentiful, with Lygæidæ next in abundance. After considering the representation of other groups Bueno concludes that "the relative abundance of the families is what should be expected, in view of the fact that the Cimicidæ [Pentatomoidea] are abundant in numbers and strong fliers and that the Myodochidæ [Lygæidæ], next to the Miridæ, are the largest of the Heteropterous families and most abundant as to individuals." In Mr. Darlington's lists, however, while the Lygæidæ are strongly represented by 6 species with 21 examples, a preponderance brought about by the frequency of the littoral *Eremocoris ferus*, the Aradidæ, insects by no means frequent in the field, have 5 species with 16 specimens—an unexpectedly high representation, and one out of all proportion to their relative abundance as gauged by ordinary methods of collecting. Mr. Darlington states that on 19th May, Aradids were at least as numerous in the drift as all other Heteroptera put together. On later occasions their relative numbers decreased. Since the collections made are likely to represent more truly the number of species present than the proportion of individuals I list the families in order according to the former criterion,—Lygæidæ, 6 spp., Pentatomidæ and Aradidæ 5 spp. each, Miridæ 4 forms, Cydnidæ 3 spp., Gerridæ and Tingidæ, 1 each. Judged on both criteria the Aradidæ come second on the list.

From the fresh and indeed frequently living condition of the stranded insects, the presence of Heteroptera in beach drift is a sure indication that each species concerned has indulged, perforce or *sua sponte*, in flights over the water. Parshley remarks that the "phenomenon is not to be explained in connection with the spring and fall flights when the air seems alive w i insects on the wing, as it has been observed at various other seasons, and for the same and other reasons such flights do not seem to be nuptial in character." He offers the suggestion that "on a clear day with a slight, on-shore breeze the surface of the ocean reflects sunlight with a peculiar sparkling brilliancy which might conceivably attract insects already flying above the land in unusual numbers because of some favouring combination of atmospheric conditions."

The outstanding feature of the present case is the unexpectedly strong representation of such cryptozoic woodland insects as the Aradids. That these bugs, in common with many social, semi-social or gregarious insects living in the same cryptozoic habitat, exhibit the phenomenon of a definite autumnal flight seems well ascertained in some species. Thus, with *Aradus australis* Erichs. in New Zealand, February appears to be a flying period during which these insects may be found in the most unlikely places, in houses, on windows in cities and often in large numbers in spiders' webs. Indications of a similar habit occur in *Ctenoneurus hochstetteri* (Mayr), a New Zealand Mezirine which has been observed flying at midday in brilliant sunshine. Bueno found two species of *Aradus* and one of *Neuroctenus* in ocean drift on 19th July.

That there is a definite spring flight of North American Aradids has been shown by Parshley (1921, p. 4). I have taken at Blue Hills, Mass., *Aradus quadrilineatus* in the open on 13th. of May. This species is included in our present ocean-drift list, as is also *Lygus pratensis* (L.), of which Mr. George Salt saw extensive flights in the vicinity of Boston during the earlier part of May. The preponderance of Bibionid flies in the first drift recorded in the present paper is obviously associated with the spring-flights so characteristic of these flies and so familiar to all who collect at that season. It seems therefore altogether probable that the occurrence in large numbers, of insects in general and of Heteroptera in particular in ocean-drift is related more often and more exclusively than Parshley believes, with definite spring and autumn flights. It is at least likely that Aradids form a considerable portion of such débris only during the spring and fall flights.

REFERENCES.

Parshley, H. M.

1917. Insects in ocean drift. I. Hemiptera Heteroptera. Can dian Entom., XLIX, pp. 45-48.

1921. Essay on the American species of *Aradus* (Hemiptera). Trans. Amer. Ent. Soc., XLVII, pp. 1-106, pls. i-vii.

Scott, H.

1926. Coleoptera in the sea. Ent. Mo. Mag., LXII, p. 115. (Records large numbers of Staphylinids struggling in the sea 2 3-4 miles from the Suffolk coast, and adds a note by J. J. Walker on great swarms of Coccinellids washed up on the Kentish shore during the great irruptions of these insects in 1869).

Torre Bueno, J. R. de la 1915.

1925. Heteroptera in beach drift. Ent. News, XXVI, pp. 274-279.

PHENOLOGY OF INQUILINE AND NEST-MAKING BEES.

By Charles Robertson

Carlinville, Illinois.

Cases observed with a flight of only 1-10 days are excluded as fragmentary. Comparisons should be made with **6**, 105-9.

Colletes and Epeolus.—Colletes flies 224 days, Mar. 20-Oct. 30, six together June 20-29 and Aug. 26-Sept. 5. It shows a maximum of 46.6 per cent June 21, 53.3 per cent flying in July and August. *Epeolus* flies 148 days, May 29-Oct. 23, four together Aug. 29-Sept. 5. Its flight is 76 days shorter than that of *Colletes*. *C. inæqualis* lacks only 3 days of completing its flight of 81 days, Mar. 20-May 31, before *Epeolus* begins. Evidently it is not infested by any *Epeolus*.

E. interruptus, May 29-June 19, is evidently an inquiline of *C. æstivalis*, May 8-July 1. It may, however, belong to *C. brevicornis*, May 29-June 29, or to both. *E. bifasciatus*, June 12-Oct. 3, is probably an inquiline of *C. latitarsis*, June 13-Oct. 1, and perhaps also of *C. willistonii*, May 28-Sept. 5; *E. pusillus*, Aug. 26-Oct. 23, of *C. americanus*, Aug. 18-Oct. 30; *E. autumnalis*, Aug. 29-Oct. 13, of *C. compactus*, Aug. 26-Oct. 21. The former pair are small, the latter large. *C. armatus*, Aug. 17-Oct. 7 may be infested also by *E. autumnalis* or by *E. coreopsis*, Aug. 20-Sept. 5.

Grænicher (**3**) says *Argyroselenis minimus* is an inquiline of *C. eulophi*, which flies 146 days, May 28-Oct. 30. I have taken *A. minimus* but once, July 8.

Mecaghilini and Cœlioxys.—The Megachilini, 14 species, fly 165 days, May 11-Oct. 22, all together for 8 days, July 3-10. Six species of *Cœlioxys* fly 161 days, May 12-Oct. 19, all together for 42 days, July 4-Aug. 14.

Megachile brevis, May 15-Oct. 22, may be infested by *C. octodentata*, May 12-Oct. 19 (I think it has been recorded in Ent. News) and *M. mendica*, May 16-Oct. 11, by *C. sayi*, May 21-Oct. 4. *Xanthosarus latimanus*, May 28-Oct. 20, is infested by *C. rufitarsis*, July 4-Oct. 19, according to Grænicher (**2**), and I have seen the inquiline enter the burrows. *Oligotropus campanulæ*, June 25-Sept. 14, is probably infested by *C. modesta*, June 25-Aug. 28, both small species. The flight of *C. texana*, June 25-Aug. 14, and *C. germana*, June 25-Sept. 3, are covered by the flight of *Megachile generosa*, June 11-Sept. 28, *M. sexdentata*, June 14-Sept. 10, and *M. petulans*, June 17-Sept. 20. According to Shuckard (7) *Cœlioxys* infests Megachilini with modified front tarsi. There are not as many inquilines as would be expected otherwise.

Osmiinæ and Stelidini.—The Osmiinæ fly 211 days, Mar. 21-Oct. 18, with a maximum of 75 per cent June 16, 90 per cent flying in June. May 21-25, 28 and June 6-11, 70 per cent are flying. The Stelidini fly 163 days, May 9-Oct. 18, all together May 7-14.

Alcidamea simplex, 85 days, May 3-July 26, and *Microstelis lateralis*, 43 days, May 9-June 20, are host and inquiline (Crawford 8, 5)., *Neotrypetes carinatus*, 144 days, May 28-Oct. 18, and *productus*, 138 days, June 3-Oct. 28, the females mixed and counted for both species, are evidently infested by *Stelidium trypetinum*, 135 days, June 6-Oct. 18. In **6**, 109, *productus* should be *carinatus*.

Bombinæ and Psithyrus.—*Bombus americanorum*, Mar. 5-Nov., and *P. variabilis*, Apr. 28-Nov., are host and inquiline, as stated by Frison (1). Their time and frequency indicate this.

Halictidæ, Sphecodini and Paralictus.—The Halictidæ, Mar. 17-Nov., are probably infested by Sphecodini, Mar. 31-Nov. *Chloralictus* is probably host of *Paralictus*, both March 15-Nov. *P. cephalicus*, May 9-Oct. 19, was taken at a bank where *C. zephyrus*, Mar. 21-Nov., was nesting.

I would arrange the Halictidæ as follows: Halictinæ, wing veins not enfeebled; Halictini: Halictus, etc.; Sphecodini: Sphecodes, etc.; Lasioglossinæ, outer veins enfeebled; Lasioglossini: Curtisapis, Evylæus; Chloralictini: Chloralictus, Dialictus, Paralictus. The last is an offshoot from *Chloralictus*. The Sphecodini were derived from Halictini, not from the forms with outer veins enfeebled.

Andrenidæ and Nomadidæ.—The Andrenidæ fly 227 days, March 17-Oct. 30, have a maximum of 68.8 per cent May 11-13, 75.5 per cent flying in May, 64.4 in April, 48.8 in June. Only one is flying July 30-Aug. 12, while 6 are simultaneous Sept. 8-20. The Nonadidæ fly 212 days, Mar. 21-Oct. 19. Twenty species fly 129 days, Mar. 27-July 27. The maximum is May 5 when there are 14 species flying simultaneously. Three species fly 54 days, Aug.27-Oct. 19, all together for 25 days, Sept. 8-Oct. 2.

Forty-five species of Andrenidæ and 20 of Nomadidæ complete their flight before August and are evidently related as host and inquiline, but there are so many that it is hard to match them. I think *Centrias erigerontis*, June 17-21, is an inquiline of *Pterandrena rudbeckiæ*, June 10-Aug. 17. *C. americanus*, Apr. 29 -July 16, ends when only 3 Andrenidæ are flying, *Pterandrena rudbeckiæ*, *Trachandrena quintilis* and *T. obscura*. It begins 42 days before any of these, in which time it evidently infests some other species. *Cephen texanus*, July 17-27, probably belongs to *Trachandrena quintilis*, July 8-29, *T. obscura*- July 16, or *Pterandrena rudbeckiæ*, which are the only Andrenidæ flying at the time. *Holonomada vincta*, Aug. 27-Oct. 2, is probably an inquiline of *Pterandrena helianthi*, Aug. 27-Oct. 10. *H. placida*, a small species, Sept. 6-Oct. 19, may belong to *Pterandrena solidaginis*, Aug. 13-Oct. 22, or *Andrena nubecula*, Aug. 13-Oct. 30. *Nomada vicina*, Sept. 8-Oct. 19, is most closely associated in time with *Pterandrena asteris*, Sept. 8-Oct. 21.

Panurgidæ and Pasititidæ.—*Holcopasites illinœnsis*, June 6-Aug. 23, is probably an inquiline of *Calliopsis andreniformis*, May 30-Oct. 14. *Heterosarus parvus* and *Pseudopanurgus albitarsis* are the only other Panurgidæ flying in the early part of June.

Anthophoridæ and Melectidæ.—Five species of Anthophoridæ fly 166 days, Apr. 8-Sept. 20, averaging 63.4 days. Excluding *Emphoropsis floridana*, the male observed for 16 days, the average is 75.2.

Bombomelecta thoracica, April 18-May 28, flies during the time of *Anthophora ursina*, April 8-June 22. *Melecta interrupta*, taken twice, June 18, July 19, is probably an inquiline of *Amegilla walshii*, July 6-Sept. 20. It no doubt flies much later than *Anthemœssa abrupta*, May 7-July 29, and *Clisoden terminalis*, May 25-July 27.

Emphoridæ, Euceridæ and Triepeolus.—The Euceridæ fly 198 days, Apr. 8-Oct. 22. Excluding *Tetralonia*, they fly 132 days, June 13-Oct. 22. *Triepeolus* flies 118 days, June 26-Oct. 21, all together for 5 days, Aug. 30-Sept. 3.

In 4, 37, I accepted Ashmead's erroneous opinion because *Triepeolus* was mixed with *Epeolus*. There were too many of them and they were too large to be inquilines of *Colletes*.

Triepeolus donatus, Aug. 11-Oct. 11 infests *Melitoma taurea*, June 24-Oct. 7 (Ashmead in 5). *T. helianthi*, Aug. 11-Oct. 3, infests *Melissodes trinodis*, June 14-Oct. 6 (Grænicher 2). *T. pectoralis*, Aug. 30-Oct. 21, coincides pretty well with *M. autumnalis* Aug. 21-Oct. 22. *Triepeolus* is too late to infest *Tetralonia*. *Tetralonia dilecta*, Apr. 18-July 14, may be infested by *Holonomada superba*, Apr. 20-June 24.

Of 296 local species, the short-tongued bees are 50.6 per cent. In general they are the primitive bees and occupy the original positions. The long-tongued bees, developed later, have turned to flowers whose nectar has become so deeply seated as to be rather inaccessible to the short-tongues. They have not displaced the lower bees, but have taken up new ecological positions. That the long-tongues have been compelled to find new places for themselves is shown in the development of inquilines, 77.7 per cent of which are long-tongues. Inquilines are 38.3 per cent of long-tongued bees and 10.6 per cent of short-tongued bees.

Of the short-tongues, the Halictidæ are the only ones which have developed inquilines, Sphecodini and *Paralictus*. Natural selection seems to have favored the development of inquilines, just as if they could live at the expense of previously established bees better than they could actively compete with them.

About the only adaptive characters shown by inquilines are differences in size. They run smaller than their hosts and the small species belong to small hosts.

The characters by which the species may be distinguished are unusually non-adaptive. The mutationists, with whom the origin of species seems to be the same as the origin of specific characters, might readily point to inquilines as species with whose origin natural selection had nothing to do.

The inquilines, however, generally, if not always, have different hosts with which their size and flight are correlated. Natural selection clearly favors this diversification. My view is that the inquilines separated first and got their specific differences afterwards.

An inquiline producing mutants infesting the same host could not produce more individuals and could not become the basis of new evolution any more than one which did not produce them.

As regards species in general I hold that everyone has selective characteristics, holds its own bionomic position, and is the result of natural selection.

Note on Sphecodini.—According to Schuckard (**7**, 108), St. Fargeau, Westwood and Latreille regarded these bees as inquilines, while Kirby and Smith regarded them as nest-makers. Mueller (**9**, 50) says they feed their young with the disgorged surplus of their own food.

LITERATURE CITED.

1. Frison, T. H. 1916. Note on the habits of *Psithyrus variabilis*. Bull. Brook. Ent. Soc. **11**: 46-7.

2. Grænicher, S. 1905. Some observations on the life history and habits of parasitic bees. Bull. Wis. N. H. Soc. **3**: 153-67.

3. ...., 1906. A contribution to our knowledge of the visual memory of bees. Bull. Wis. N. H. Soc. **4**: 138-9.

4. Robertson, C. 1899. On the flower visits of oligotropic bees. Flowers and insects XIX. Bot. Gaz. **26**: 27-37.

5. ...., 1899. Flower visits of oligotropic bees. Bot. Gaz. **28**: 215.

6. ...., 1924. Phenology of anthophilous insects. Flower visits of insects II. Psyche **31**: 93-111.

7. Shuckard, W. E. 1866. British bees.

8. Swenk, M. F. 1914. Studies of North American bees. University Studies. Lincoln Nebr. **14**: 1-36.

9. Mueller, H. 1883. Fertilisation of flowers.

DESCRIPTIONS OF FOUR NEW SPECIES OF EUSTICTUS (HEMIPTERA, MIRIDÆ).[1]

By Harry H. Knight,

Ames, Iowa.

Eustictus ainsliei n. sp.

This species runs to *venatorius* Van. D., in my key to the species (Hem. Conn., 1923, p. 481), but is distinguished by the long hairs on antennal segment I, by the shorter length of segment I as compared with width of head, by the long bristle-like hairs on pronotum, and long hairs on hind femora instead of spines.

♂. Length 6.4 mm., width 2.4 mm. Head: width 1.32 mm., vertex .23 mm. Rostrum, length 3 mm., extending upon fourth ventral segment. Antennæ: segment I, length .98 mm., thickness .17 mm., set with erect bristle-like hairs, length of several hairs greater than diameter of segment, mottled with black and white; II, 2.7 mm., brownish black with a few fine pale marks evident; III, 1.4 mm., with more pale than segment II; IV, 1.35 mm., brownish black. Pronotum: length 1.23 mm., width at base 2.14 mm.

Coloration very suggestive of *venatorius*, but more broadly white on hemelytra, basal half of pronotum, and front of head; calli black, with five blackish rays extending back half way to basal margin. Dorsum clothed with erect long hairs, distinctly bristle-like on pronotum; apical half of femora and basal half of hind tibiæ set with long erect hairs, the hind femora without true spines such as are found in *venatorius*.

Holotype: ♂ April 14, Orlando, Florida (G. G. Ainslie), collected at light; author's collection. Named after the collector, Mr. G. G. Ainslie who kindly presented the specimen.

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[1] Contribution from the Department of Zoology and Entomology, Iowa State College, Ames, Iowa.

Eustictus spinipes n. sp.

Allies to *mundus* Uhler, but distinguished by the longer antennal segment I and the strong spines on apical half of femora and basal half of hind tibiæ.

♂. Length 4.9 mm., width 1.8 mm. Head: width 1.01 mm., vertex .36 mm.; eyes smaller and vertex much wider than in *mundus*. Rostrum, length 2.46 mm., attaining base of fourth ventral segment. Antennæ: segment I, length .81 mm., thickness .157 mm., set with short bristle-like hairs which in length do not exceed half the width of segment; II, 2.2 mm.; III, 1.14 mm.; IV, .94 mm.; all the segments red without dark markings, last segment somewhat darker red. Pronotum: length 1.06 mm., width at base 1.67 mm.

Coloration very similar to *mundus* but with antennæ reddish. Hind femora with several long spines on apical half, occurring on dorsal surface near apex only; hind tibiæ set with regular rows of strong spines, longer on basal half, length exceeding thickness of tibia.

Holotype: ♂ August 25, 1925, Sanford, Florida (E. D. Ball); author's collection.

Eustictus pilipes n. sp.

Coloration nearly as in *spinipes*, but differs in the long, erect hairs on first antennal segment and the longer, erect hairs on tibiæ and femora.

♀. Length 5.9 mm., width 2.2 mm. Head: width 1.13 mm., vertex .46 mm. Rostrum, length 2.93 mm., extending upon fifth ventral segment. Antennæ: segment I, length .97 mm., thickness .18 mm., bearing erect bristle-like hairs, several of which exceed thickness of segment; II, 2.77 mm.; III, 1.42 mm.; IV, 1.14 mm.; red, without black marks. Pronotum: length 1.13 mm., width at base 1.89 mm.

Coloration nearly as in *spinipes*, but head, antennæ, and legs of deeper red. Spines on basal half of hind tibiæ replaced by long hairs several of which in length are equal to three times thickness of tibia. Femora also bearing long hairs on ventral margin, and apically on posterior and dorsal margins.

Holotype: ♀ August 30, 1925, Sanford, Florida (E. D. Ball); author's collection. *Paratypes*: 2♀ July 18, 1894, Tavures, Florida.

The coloration of this species would suggest that it might be the female of *spinipes*, but of twelve species known from both sexes, no variation of tibial spines and hairs, and type of hairs on antennæ occurs.

Eustictus pubescens n. sp.

Distinguished by the short but rather abundant pubescence on legs, body and antennæ; legs and antennæ uniformly yellowish without black marks.

♀. Length 5.7 mm., width 2.74 mm. Head: width 1.2 mm., vertex .40 mm. Rostrum, length 2.29 mm., scarcely attaining posterior margins of intermediate coxæ. Antennæ: segment I, length .68 mm., thickness .18 mm., clothed with very short stiff pale hairs; II, 1.7 mm., somewhat more slender at base; III, .97 mm.; IV, 1.11 mm.; uniformly yellowish. Pronotum: length 1.21 mm., width at base 2.3 mm.; rather sparsely and coarsely punctate; scutellum smooth.

Coloration rather uniformly yellowish, pronotal disk and scutellum fuscous, calli paler. Embolium broad and flat, clear, yellowish to red on apex, embolar margins thickly set with short pubescence. Membrane, inner and apical angles of cuneus, fuscous. Legs thickly clothed with erect, short pale pubescent hairs, tibial spines very short and confused with the hairs.

Holotype: ♀. June 11, 1913, Monticello, Florida (H. B. Scammell); Cornell University collection.

METHODS OF ORIENTATION IN DRAGON-FLY LARVÆ

By C. E. Abbott

Elgin, Illinois.

Most terrestial insects orient themselves through vision, and most of them take advantage of the direction of light rays. Although other factors may influence the direction in which a given individual will travel, the visual, and possibly the olfactory, senses seem to be those chiefly utilized in maintaining a direct path. The only studies of a complete nature relating to this phenomenon in aquatic insects were made by Holmes (1905).

In the following experiments, the larvæ of *Anax junius* and some species of Aeschna were employed. Two larvæ were taken from the water, and the left eye of one insect and the right eye of the other covered with asphaltum. As soon as the asphaltum hardened they were put back into the water for about an hour. They were then removed and placed on a sheet of white paper. Their courses were traced with a pencil as they crawled. Ten such tracings were taken at one time; the animal was then placed in the water and allowed to rest. Thirty tracings in all, were taken for each of the two insects. The animal always turned toward the side with the covered eye. Often, after a few trials, the paths were almost straight; showing that habit tended to overcome the turning. These experiments were conducted in diffuse daylight.

Other experiments were tried with a beam from a 500 watt bulb. A larva with the left eye covered was placed at right angles to the beam and to the left of its source. In twenty-one trials it turned five times to the left, eight to the right, four times it followed a straight course, and finally turned four times to the right. On the following evening it turned seven times to the left, eighteen times to the right, once it took an irregular course, and once turned to the right. Two evenings later it first followed a straight course once, turned six times to the left, once followed a straight course, and finally turned seven times to the right. On the same evening, this insect was tried facing the light. Once it followed a straight course, once turned to the left, again moved in a straight course once, turned twice to the right, to the left once, moved straight ahead once, turned to the right once, and resume ' the straight course five times. An insect with the right eye covered entered the light at right angles and at the left of its source. This larva turned to the right twice, took one irregular path, turned to the right once, to the left twice, to the right once, and to the left twenty-one times. When facing away from the source of light, it first followed a straight course, and then turned to the left twenty times. Facing the light, it turned always to the left.

Observations based on a study of these larvæ in their natural habitat or in aquaria gives some clue to the above irregularities. The insects are strongly thigmatropic. When a number of them are put into a vessel containing nothing but water, they will cling to one another until a great mass of intertwined insects is formed. This mass is not easily broken by the addition of chemicals, but very warm water will scatter the larvæ. Normally, these larvæ will seek out small sticks or the stems of plants and cling to such objects. Usually the entire ventral surface of the insect is in contact with this substratum, and the legs surround it in a close embrace. This brings the long axis of the insect's body parallel to the object upon which it rests.

The revolving disc that Dolley (1916) used so successfully in his experiments on *Vanessa antiopa* had no influence on the young dragon-flies, either in or out of the water. The nature and direction of light was a little more effective. Among aquatic insects the tactile sense seems to be only a shade less important than vision, and in may cases even more important. Anax and Aeschna larvæ orient primarily through contact stimuli. The influence of vision in orientation is secondary.

LITERATURE.

Dolley, W. L.

1916. Reactions to light in the mourning-cloak butterfly, *Vanessa antiopa*. Jour. Exper. Zool. XX, p. 357.

Holmes, S. J.
1905. The reactions of Ranatra to light. Jour. Comp. Neur. and Psych. XV, No. 4.

NEW NAME FOR ODYNERUS CLYPEATUS ROBERTSON.—On account of *Odynerus clypeatus* Saussure 1852, this is changed to *Odynerus bradleyi* Robertson.—Charles Robertson, Carlinville, Illinois.

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